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JOHN WILLIAMS, Secretary.
Office, 381 Fourth avenue, New York City.

PROPOSED GENERAL SPECIFICATIONS FOR FIRE ALARM SIGNAL SYSTEMS FOR FACTORY BUILDINGS.

COMMITTEE ON FIRE HAZARDS.

Richard J. Cullen, Member of the Industrial Board, Chairman.

C. K. Mallory, Engineer of Construction and Maintenance, Solvay Process Company, Syracuse, N. Y.

James H. Haste, Manager Kodak Park Works, Eastman Kodak Co., Rochester, N. Y.

John Gill, Bricklayers' Union, New York City.

John F. Connor, International Stereotypers' Union, New York City.

E. A. Tredwell, Board of Brokers, New York City.

J. O. Hammitt, Chief, Bureau of Fire Prevention, New York City.

P. J. Gillespie, Chief Engineer, State Fire Marshal's Department, Albany, N. Y.

John H. Derby, Fire Prevention Engineer, New York City, Representative of the National Fire Protection Association.

F. J. T. Stewart, Superintendent of Board of Fire Underwriters, New York City.

Miss Frances Perkins, Executive Secretary, Committee on Safety (Fire prevention), New York City.

William Guerin, former Acting Chief, Bureau of Fire Prevention, New York City.

SPECIAL COMMITTEE ON FIRE ALARM SIGNAL SYSTEMS.

RICHARD J. CULLEN,
P. J. GILLESPIE,
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M. J. HORAHAN,
E. A. FALLER,
W. GUERIN.

A public hearing on the proposed general specifications for fire alarm signal systems will be held in the **Hearing Room of the Industrial Board at 381 Fourth avenue, New York city, Wednesday, March 25, at 10 a. m.** You are invited to be present.

Additional copies of these specifications may be obtained upon application to the Secretary.

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General Specifications for Fire Alarm Signal Systems for Factory Buildings more than two stories in Height, where more than twenty-five persons are employed above the ground floor.

GENERAL.

All devices and equipment constructed and installed under these specifications shall conform to the requirements of the Industrial Board.

Specifications, wiring diagrams and floor plans showing complete equipment, including source of electrical energy and the location of fire alarm boxes and signaling devices, shall be filed in duplicate with the Fire Commissioner in the city of New York, or with the State Fire Marshal in all other parts of the State, they being designated by law as the supervising authorities. Full information shall also be given regarding location of all exits, stairways, elevators and partitions, together with a statement indicating the make and type of fire alarm equipment to be used and a schedule of signals indicating each floor. A copy of the approved plans and specifications will be returned as authority to proceed with the work.

Information shall be obtained from the supervising authority designating the location and number of boxes and signaling devices required in each factory building and a sketch showing this information will be furnished as a guide in preparing working plans in duplicate for approval.

All work shall be done in a workmanlike manner to the entire satisfaction of the Fire Commissioner in the city of New York or the State Fire Marshal in all other parts of the State.

Fire alarm signal systems heretofore installed in the city of New York and approved by the Bureau of Fire Prevention of said city may be accepted in its discretion by the Industrial Board upon formal application for such approval.

All material shall be rigidly secured in position, and when attached to masonry walls shall be properly fastened by metal expansion shields or toggle bolts. Wooden plugs will not be accepted. When deemed necessary by the supervising authority to mount fire alarm apparatus upon a back board, such back board shall be not less than seven-eighths of an inch (7/8″) in thickness, filled with a non-absorptive compound with an air space of at least one-quarter of an inch (1/4″) behind the back board for the free circulation of air.

Tests.

All systems shall test free of grounds and the contractor shall upon the completion of the fire alarm system make a satisfactory test of the entire equipment in the presence of and under the direction of the supervising authorities or their authorized agent, before final approval and acceptance. The contractor shall also furnish all the necessary tools to conduct this test.

Guarantee.

It is suggested that the entire system including all alarm boxes, signals, wiring, batteries and other devices shall be guaranteed against any defects in material or workmanship for a period of two years from the date of acceptance by the supervising authority; any defects which may develop in the equipment during this period to be remedied by the contractor without expense to the owner.

It is recommended that contracts for installation of systems contain a clause stating that the final payment will be withheld until acceptance by the supervising authority.

Equipment.

Approved fire alarm equipment is manufactured by and can be procured from the leading manufacturers and electrical supply jobbers in the principal cities. Manufacturers must submit to the Industrial Board, for general approval, samples of their devices and equipment constructed for use under these requirements. Apparatus so submitted and approved shall again be subject to inspection upon installation and shall be rejected if working unsatisfactorily or if differing from the sample summitted for general approval.

Accessories.

Automatically operated circuit breakers and engine stops for shutting down machinery in extremely noisy or hazardous premises may be required, connected with and made a part of the fire alarm system. In no case shall circuit breakers or engine stops be installed in such a manner as to cut off the power for lighting current or for operating elevators.

DESCRIPTION OF SYSTEMS.

Systems including all fire alarm boxes and signaling devices shall be wired on closed circuits (see diagram No. 1); signaling devices wired on open circuits shall not be used except by special permission of the Industrial Board. Boxes in all cases to be on closed circuits. A current flow of at least fifty per cent in excess of the minimum current capable of transmitting a fire alarm signal must be maintained; a weaker current to constantly supervise each closed circuit may be permitted under conditions acceptable to the Industrial Board.

When an alarm has been sent in from any one of the alarm boxes, all the signaling devices on the various floors of the building shall automatically sound the number indicating the floor from which the alarm was sent and shall repeat the signal at least four times. The fire alarm system shall not be used for any other purpose. A milliammeter or other approved current indicator shall be provided in every closed circuit. All signaling devices, alarm boxes, relay boxes and alarm box enclosing cases shall be finished in red to distinguish them from other signaling apparatus.

Trouble Signals.

A trouble bell shall be provided in connection with each closed circuit to ring continuously in case of weak batteries or an opening of the circuit. The bell, which shall be of an approved design of the vibrating type, must be placed in the engine room or other approved central point. At least four cells of open circuit battery of approved make and type shall be provided for the bell. The bell and battery shall connect with the contacts of a relay having its magnet windings in series with each closed circuit.

Maintenance.

The system shall be tested every morning immediately after the hour of starting work in the building to insure the system and the batteries being in an operative condition. The test signal shall consist of two taps or blasts. Each alarm box shall be operated at least once every month to prove that the mechanism is in perfect working order in addition to necessary use of boxes in fire drills. All apparatus operated by springs requiring winding shall be rewound after each alarm and kept in normal condition for operation. A complete record shall be kept of the operation of each system, which will be subject to inspection by the supervising authority, or their authorized agent.

Fire Alarm Boxes.

There shall be one or more fire alarm boxes on each floor of the building located in the natural path of escape from fire; there should preferably be a box at each required means of exit. Boxes shall be of an approved type and make and may be operated by a lever or by breaking glass. The box should be so designed that when once started the proper transmission of a complete set of signals cannot be interfered with by manipulation of its starting device. Each box shall be arranged to send a definite code of signals to indicate the floor or portion of same on which it is located. Not less than three taps or blasts shall be sounded at each revolution of the break wheel. The following suggestion is offered as a guide to assist in the arrangement of the signal code but is not to be considered as mandatory.

Single building of four floors and basement.— First floor 2–1, second floor 2–2, third floor 2–3, fourth floor 2–4, basement 2–5.

Whenever fire alarm boxes are made a part of a system in which electro-mechanical gongs are employed, break wheels should be so designed that the single duration shall be not less than one-half second with silent interval of not less than one-half second between signals, except between numbers consisting of two or more digits and silent period between rounds.

Lever boxes, except succession boxes, shall be designed to automatically wind when lever is pulled for alarm. All parts of the mechanism shall be of the best grade and workmanship. Contact points operated by a break wheel and contact points on testing devices shall be of platinum silver, or other approved material, and shall be of the scraping type. All contact points shall be secured in a substantial manner to phosphor bronze springs which shall be insulated from the mechanism of the boxes. The break wheel shall be made of suitable non-conducting material or insulated from the carrying shaft. The contacts shall be so constructed as to positively break a circuit carrying 250 volts and 1/10 ampere under actual working conditions. All stations shall be provided with means of testing, comprising arrangements to make such tests without operating the break wheel of the box. Provision shall also be made for a silent test of the box mechanism without operating the signaling devices. The testing device shall be of a design which will prevent any person except those in authority from operating same. Testing devices must be so designed as to prevent the possibility of box being left inoperative.

There shall be a metal case enclosing the movement completely and made dust proof as far as possible by the use of gaskets or other suitable means. The metal case shall be drilled and tapped to receive standard conduit at top and bottom. All pull box cases shall be fitted with a door which can readily be opened, so constructed as to protect the pull lever against accidental injury and on which a handle is rigidly secured. The wording "In case of Fire open Door and pull down lever as far as it will go," or equivalent instructions, must appear on the door. If used in exposed places the box shall be enclosed in a suitable weatherproof outer shell. Approved types of break-glass boxes will be acceptable with no additional protection, except where made necessary by weather conditions; and all break-glass type fire alarm boxes shall be provided with suitable hammers on chains which shall be attached to or near the boxes so that the glass can readily be broken. All break-glass boxes shall have lettered on the fronts the words "Fire Alarm — In case of Fire break glass." All boxes requiring glass replacements shall be so arranged that replacements cannot be made until the mechanism is reset for another alarm.

SIGNALING DEVICES.

General.

Signaling devices may consist of bells of approved type, or other devices acceptable to the Industrial Board. There shall be installed on each floor of the building one or more alarm devices, sufficient in number and efficiency to be plainly heard throughout the floor, above the noise of the machinery and other sounds. Where floors are divided by fire walls each section may be deemed a separate floor for the purposes of these requirments. Systems consisting of several types of sounding apparatus should be avoided. The number of signal devices on a circuit may be limited at the discretion of the supervising authority.

All signaling devices shall be of an approved type and the movement enclosed in a dust-proof metal casing insulated from all current carrying parts. Where conditions require it damp-proof casings shall be installed. Signaling devices shall be placed with their lowest parts about eight feet from floor. Wherever there is danger of mechanical injury, the entire device shall be enclosed in a protecting case made of approved wire netting or perforated metal. This casing shall be insulated from all current carrying parts, but grounded to conduit.

Magnet windings shall be impregnated with an insulating moisture repelling compound or shall be of enameled wire. All internal connections must be properly protected, securely made, and where subject to motion to be of stranded flexible wire with substantial insulation. Binding posts shall be of such a character that wire is held between two flat surfaces; posts employing a set screw the end of which is used to pinch or bind the wire will not be accepted.

Gongs shall be made of a high grade of cast bell metal or other approved material.

Adjustments must be of such a character that they can be securely locked in an approved manner.

Contact points shall be ample in area, not only to take care of current used in operation, but to insure long life, and shall be of pure silver, platinum, or other approved material.

Hammer rod shall be suitably protected against mechanical injury or derangement by the use of a guard or other suitable means.

RELAYS.

All relays shall be of an approved type and make. Magnet windings shall be impregnated with an insulating moisture repelling compound or shall be of enameled wire. All relays shall be enclosed in an approved metal case under lock and key and located where there is no danger of sparking contacts igniting inflammable gases or flyings.

Relays shall be mounted where they will be least affected by vibration in the building, and in no case shall they be mounted on the same back board with sounding apparatus, or so that they will be affected by the vibration caused by such sounding apparatus, and shall be marked plainly with the resistance value to which the magnets are wound.

WIRING.

The following methods of and materials for the wiring of the system will be approved:

All conductors shall be run in approved metallic conduits or armored cable.

The conduit system shall be permanently and effectually grounded.

All conductor wires used shall be rubber covered and braided National Electric Code standard. The coil shall bear manufacturer's name and month and year of manufacture.

Wiring in all systems shall be installed after the manner prescribed under National Electric Code rules as applying to conduit and armored cable installation except that single braided wire may be used when source of energy is from primary batteries.

In vertical risers no splices will be permitted. All splices shall be made secure, electrically and mechanically, and be soldered, without the use of an acid flux, and insulated with rubber and friction tape. All splices shall be in junction or terminal boxes.

No conductor of less than 16 B. & S. gauge nor having a rubber insulation wall of less than 3/64″ thick will be approved. Multiple conductor cables not complying with the above requirement shall be subject to special approval.

Where wires pass from one building to another, they must be enclosed in conduit under ground between buildings, wherever possible, and when so installed must be lead encased.

Wires between buildings when not run in conduit must be at least equivalent in conductivity and tensile strength to No. 12 B. & S. copper for box and signaling circuits. They must be supported at least every seventy-five feet on approved glass insulators and brackets. As far as possible they should be run under rather than over electric light or power wires, and be provided with safety devices in accordance with the National Electric Code rules.

Sources of Electrical Energy.

The following sources of energy may be employed:

1. Storage batteries in duplicate.

2. Electric light or power system (public service or isolated plant) supplemented by storage batteries.

3. Energy from private (isolated) plant as preferred source supplemented by energy from public service lines.

4. Primary batteries in duplicate.

Storage Batteries.

Storage batteries may be employed if under competent supervision and equipped with reliable charging and controlling devices. The following rules apply to such installations:

A sufficient number of storage cells shall be provided in battery to secure maximum efficiency in operation, the required number in each installation to be approved by the supervising authority.

Complete details of installation shall be filed in duplicate and approved in each case before the necessary installation is commenced.

Storage batteries shall be of approved make and type, and shall be in duplicate sets. Each set to be capable of maintaining the system efficiently for five days without recharging.

Storage batteries shall be installed in an approved manner in properly ventilated protecting cabinets and wherever possible shall be placed in a room separate from that containing other fire alarm apparatus. If these batteries are placed in a separate room with proper ventilation and where they will not be subject to mechanical injury, protecting cabinets will not be required.

The battery in service shall not be disconnected from the fire alarm system during working hours in the factory.

A difference of potential of more than fifty volts will not be allowed on working circuits of storage battery systems when the current flow at any time through any part of the system is more than one ampere.

A full description of the operation of each system, together with instructions for its proper care and maintenance, must be posted in a conspicuous place and in a substantial manner near a point where the person in charge of the system is generally employed.

The potential of the charging circuits shall not be over 250 volts and these circuits shall be installed in compliance with the rules of the National Electrical Code.

Charging Boards.

A suitable charging switchboard of slate, marble or other approved material shall be provided, constructed in accordance with National Electrical Code rules, and shall be provided with not less than the following equipment:

For direct current.— A main double pole, National Electrical Code, fused knife switch of proper capacity arranged for enclosed National Electrical Code fuses, except that fuses of one-half ampere capacity or less need not be enclosed if properly guarded. These fuses to be approximately 10 per cent in excess of maximum charging rate of batteries.

Underload circuit breaker of approved type.

Volt meter.

Ammeter, arranged to read charging rate.

Milliammeter, arranged to read current flow through closed circuit or circuits.

Double throw switch for changing from one set of batteries to the other, so arranged that the working circuits cannot be opened during the process of shifting.

Double pole, double throw charging switch.

Fixed Resistance.

Fixed resistance units (National Electrical Code standard) to be provided, one in each leg of the charging circuit of such a value as the operating conditions may warrant, but in no case shall the charging rate be in excess of two-thirds of the normal charging rate of the storage cells unless a variable charging rate is required. (See Variable Resistance.)

Variable Resistance.

One-third of the total resistance to be used shall be fixed in each leg of the charging circuit, and the balance provided with approved shifting device for varying the charging rate; the minimum resistance to be such that the batteries cannot be charged in excess of their normal charging rate. Resistance in any case shall not unduly heat.

Lamps for resistance will not be accepted.

Each circuit shall be provided with fuses of one-half ampere capacity.

Motor Generators.

Motor generators of suitable capacity and standard design may be used for charging storage batteries and when used shall be installed in accordance with National Electrical Code rules and a proper field regulator provided in addition to regular switchboard equipment referred to above, except that resistance in charging circuit will not be required.

For Alternating Current.

When alternating current is used for charging storage batteries, approved motor generator or rectifying sets with necessary transformer, National Electrical Code standard, shall be provided, together with approved switchboard equipment.

NOTE.— When electrolytic rectifyers of a type and design bearing the approval of the Industrial Board are employed, a reserve set of electrodes and charge of salts shall always be on hand and may be installed only where they will be under competent supervision.

Electric Light and Power System

(Public Service or Isolated Plant.)

Supplemented by Storage Batteries and

Private (Isolated) Plant Energy as Preferred Source.

Supplemented by Energy from Public Service Lines.

Systems of this character are special, and complete details of installation shall be submitted for approval to the Industrial Board.

The Industrial Board may waive the requirement of supplementary storage batteries when the service furnished by the Public Service lines in any district or community is deemed by the Board to be adequate to all demands upon it, and for such districts or communities and for such periods as the Board may, from time to time, determine.

Primary Batteries.

The battery on the closed circuit shall be in duplicate and be provided with a base of slate, porcelain or other approved material, double pole, double throw, knife blade type switch of approved design, so arranged that when changing from one set of batteries to the other, the circuit cannot be broken, and shall consist of approved closed circuit cells of not less than 300 ampere hours capacity, except that other approved types of cells may be used in closed circuits containing no fire alarm boxes. When lead batteries are used, approved heat resisting jars are preferred, and at least one transparent glass jar shall be used in each series for the purpose of observing the condition of the elements.

The voltage on any circuit where primary batteries are used shall not exceed 40. (The working voltage of approved closed circuit cells is .65 per cell.)

All batteries shall be coupled together by means of approved type battery connectors.

All batteries shall be placed in a substantial protecting cabinet, elevated not less than six inches nor more than five feet above the floor, located in a clean, dry and cool place, and where the temperature will be not less than 40 degrees Fahrenheit nor more than 100 degrees Fahrenheit.

Main battery cabinets shall be so constructed that the condition of the elements may be observed without disturbing the cells.

Battery Cabinets.

Metal — Shall be of approved type, constructed of sheet iron or steel, not less than No. 14 gauge, properly reinforced by 1-inch angle iron. Doors shall be self-closing and provided with an approved lock and key.

Cabinet shall be provided with wood shelves not less than ⅞-inch thick and properly fastened and secured to prevent sagging.

The interior and the exterior of the cabinet shall be painted with three coats of asphaltum compound, each coat to be thoroughly dry before the next is applied; or baked enamel will be accepted in lieu thereof.

Supports for dry batteries shall be constructed in such a manner that it will be impossible for the cells to come in contact with the metal enclosure.

Wood — Battery cabinets shall be constructed of the best grade of kiln dried whitewood or ash, not less than ⅞-inch thick. Cabinet shall be provided with two self-closing doors and approved lock. Shelves shall be not less than ⅞-inch thick, properly fastened and secured to prevent sagging.

All parts shall be properly fitted and cabinet shall be of substantial construction.

Cabinet shall be painted on the interior with three coats of asphaltum compound and on the exterior with three coats of lead paint or two coats of varnish.

Cabinet shall be thoroughly ventilated.

Description of Diagrams to Accompany Specifications for Fire Alarm Systems for Factories in the State of New York.

Diagram No. 1.

This shows a closed circuit system with box and gongs on the same circuit. This arrangement is only suitable for electro-mechanical gongs.

Diagram No. 2.

This is a supervised closed circuit system, employing a separate box circuit and a separate gong circuit. It is recommended where vibrating bells on closed circuit are to be used. These bells must be so arranged that they will operate in series.

Diagram No. 3.

This is a modification of the system illustrated in Diagram No. 2, and it is recommended where single stroke electric bells are to be used. The reversing of the polarity in the gong line for each stroke does away with the difficulties experienced in operating large single stroke bells on closed circuits.

DIAGRAM 1.

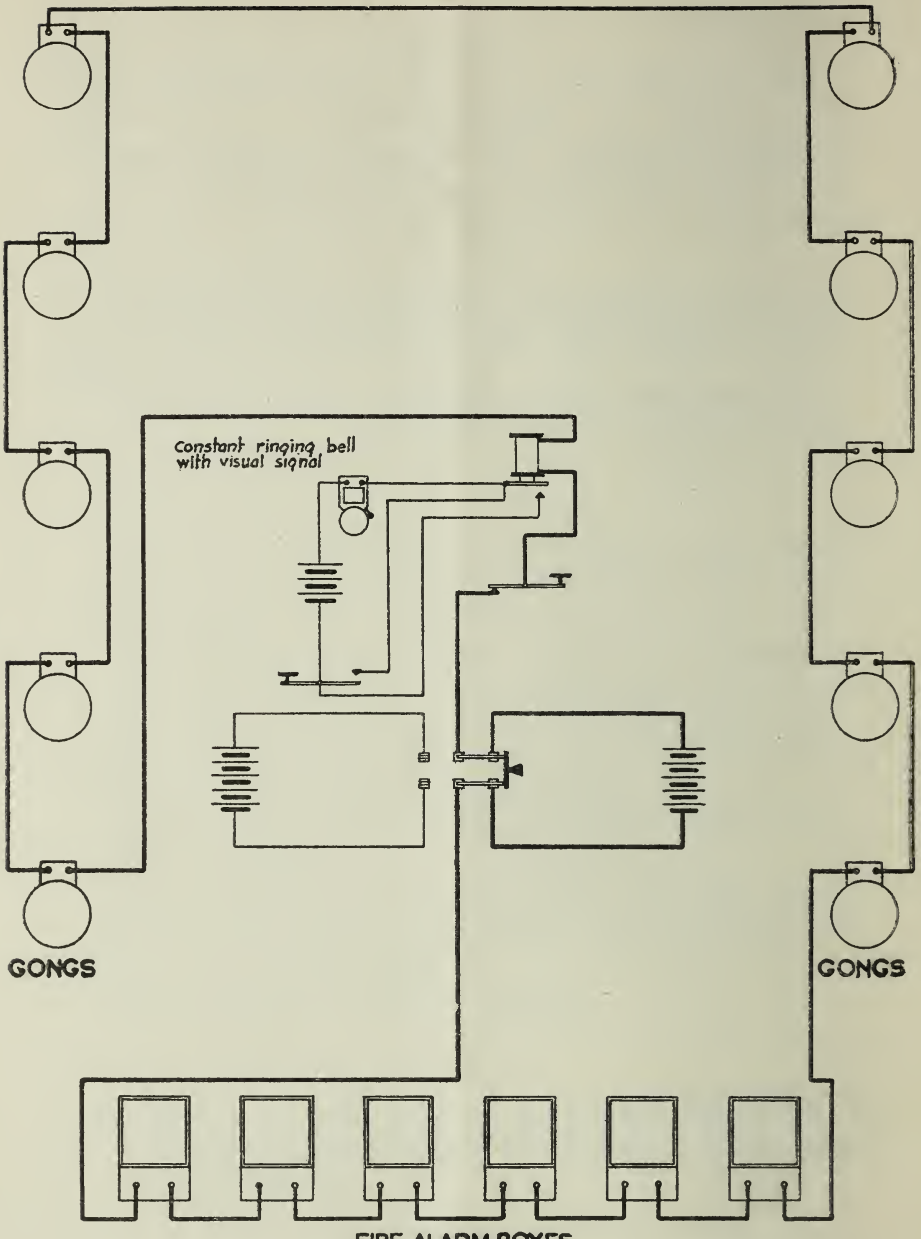

DIAGRAM OF INTERIOR FIRE ALARM SYSTEM

DIAGRAM 2.

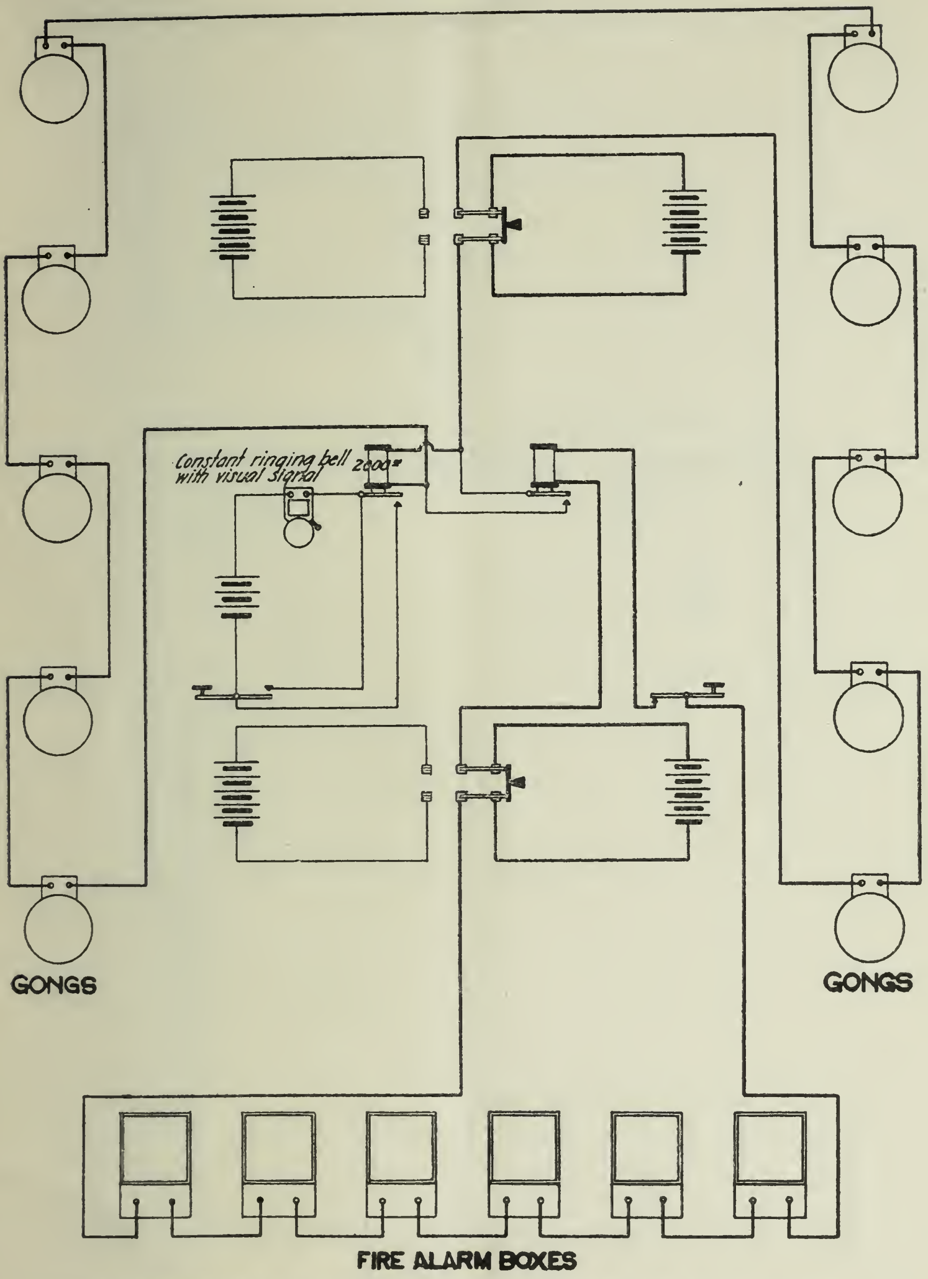

DIAGRAM OF INTERIOR FIRE ALARM SYSTEM

DIAGRAM 3.

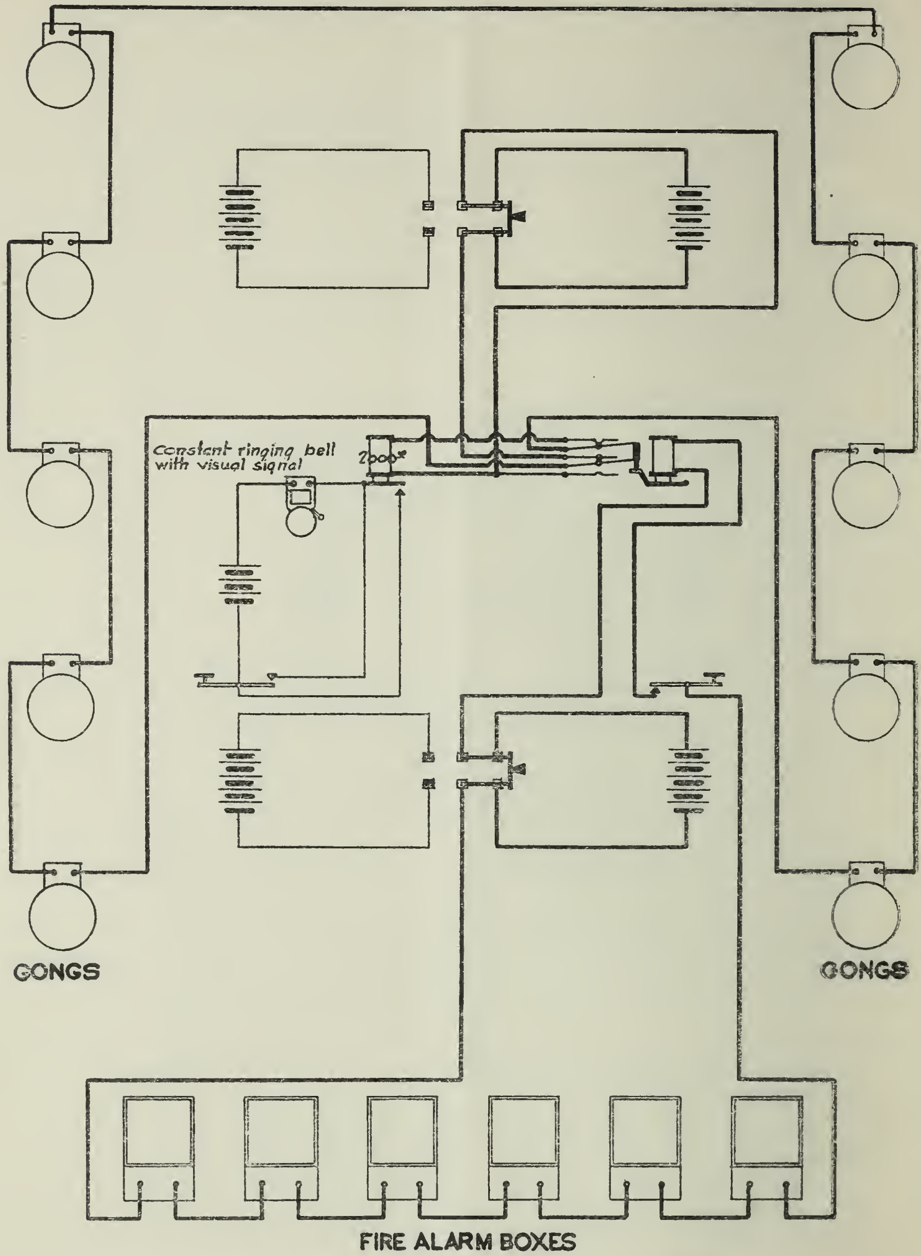

DIAGRAM OF INTERIOR FIRE ALARM SYSTEM

POLARITY REVERSING GONG LINE

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